Знакомство с языком R и средой R-Studio (Тюленева Евгения, ИТ-50916)

Синтаксис

```
> "Hello R!"
[1] "Hello R!"
> date()
[1] "Sat Nov 21 18:29:34 2020"
> 1+2
[1] 3
> 1/(2+3) == 5
[1] FALSE
> 1:5
[1] 1 2 3 4 5
> as.matrix(4:9)
     [,1]
[1,]    4
[2,]    5
[3,]    6
[4,]    7
[5,]    8
[6,]    9
> seq(from = 11, to = 15, by = 1)
[1] 11 12 13 14 15
> order(1:3, decreasing = TRUE)
[1] 3 2 1
> order(1:3)
[1] 1 2 3
> rev(11:15)
[1] 15 14 13 12 11
> i <- sample(5)
> i
[1] 3 1 2 4 5
>
> j <- order(i, decreasing = TRUE)
> list(i, j)
[[1]]
[1] 3 1 2 4 5

[[2]]
[1] 5 4 1 3 2

> j
[1] 5 4 1 3 2
> i[order(i)]
[1] 1 2 3 4 5
>
>
> x<-"Привет"
> y<-"Мир"
> z<-c(x,y)
> x
[1] "Привет"
> y
[1] "Мир"
> z
[1] "Привет" "Мир"
> print(z)
[1] "Привет" "Мир"
> |
```

Графики


```r
install.packages("ggplot2")
library(ggplot2)
qplot(data = iris, x = Sepal.Length, y = Petal.Length)
qplot(data = iris,
      x = Sepal.Length,
      y = Petal.Length,
      color = Species,
      size = Petal.Width,
      alpha = I(0.7))
```
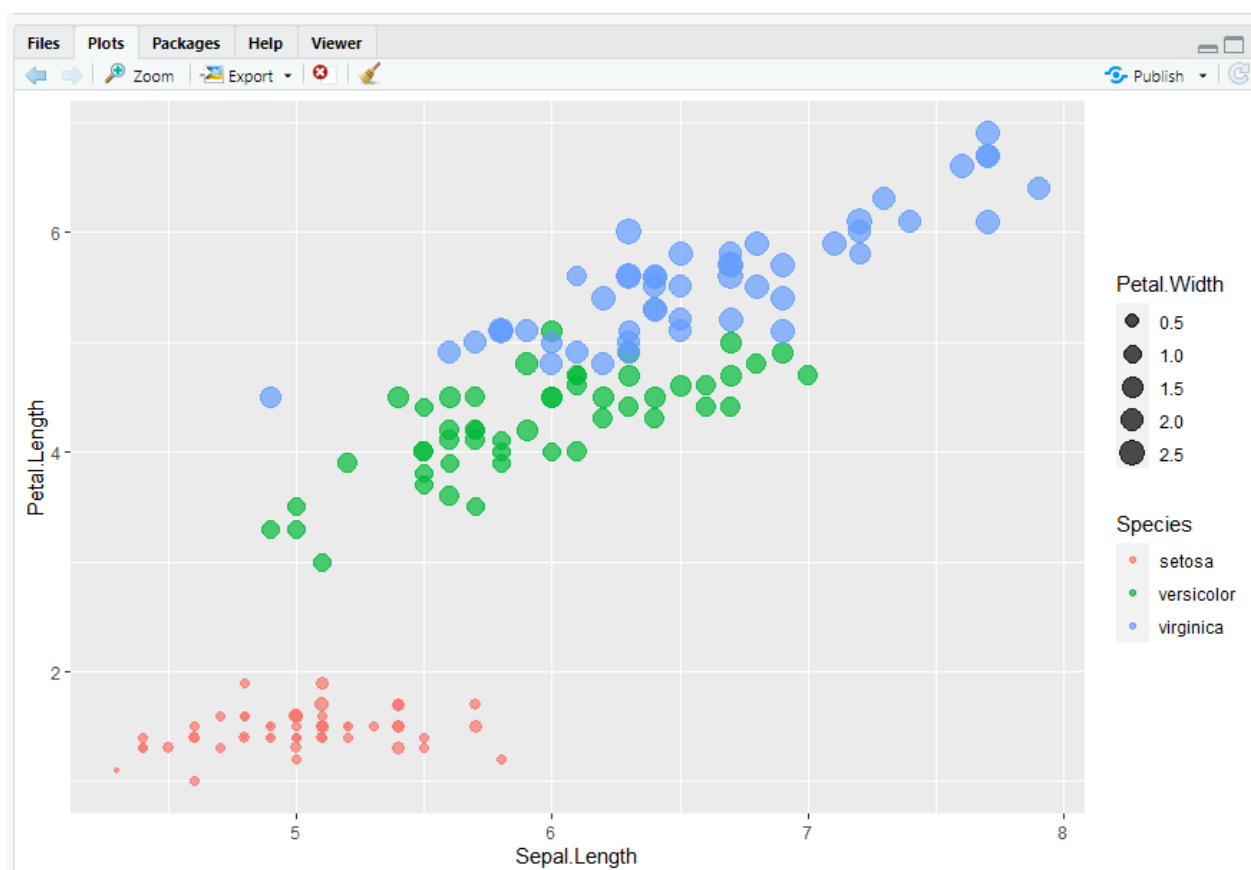

Функции


```r
> 
> fx<-function(x) x*x
> f<-function(a,b) fx(a) + fx(b)
> f(2,3)
[1] 13
> 
```

Справка

```
>
> help.start()
Если ничего не произойдет, надо открыть
'http://127.0.0.1:16126/doc/html/index.html'
 самостоятельно
> ?round
>
>
>
>
>
>
```

signif rounds the values in its

Usage

```
ceiling(x)
floor(x)
trunc(x, ...)

round(x, digits = 0)
signif(x, digits = 6)
```

Проблемы с плавающей точкой

```
> 0.33 == 3 * 0.11
[1] TRUE
> 0.45 == 3 * 0.15
[1] FALSE
> round(0.45, 2) == round(3 * 0.15, 2)
[1] TRUE
```

Векторы

```
> x <- c(20, 46, 78, 32)
> y <- c(-20, -46, -78, -32)
> x+y
[1] 0 0 0 0
> x+c(-20, -46)
[1]   0   0  58 -14
>
```

Массивы

```
[1]   0   0  58 -14
> mas <- c(1,2,3,4)
> mas.a <- array(mas, dim = c(2, 2))
> mas.a
      [,1] [,2]
[1,]    1    3
[2,]    2    4
>
> dim(mas.a)
[1] 2 2
> is.vector(mas.a)
[1] FALSE
> is.array(mas.a)
[1] TRUE
> typeof(mas.a)
[1] "double"
> str(mas.a)
 num [1:2, 1:2] 1 2 3 4
> attributes(mas.a)
$dim
[1] 2 2
```

Обращение к массивам

```
> mas.a[1,2]
[1] 3
> mas.a[,2]
[1] 3 4
> mas.a[2,]
[1] 2 4
> which(mas.a > 2)
[1] 3 4
> rowSums(mas.a)
[1] 4 6
> mas.b <- array(c(-1,-2,-3,-4), dim = c(2,2))
> mas.c <- mas.a + mas.b
> mas.c
     [,1] [,2]
[1,]    0    0
[2,]    0    0
> |
```

Матрицы

```
> m <- matrix(c(40,1,60,3), nrow = 2)
> m
     [,1] [,2]
[1,]   40   60
[2,]    1    3
> is.array(m)
[1] TRUE
> is.matrix(m)
[1] TRUE
> six.fives <- matrix(rep(5,6), ncol = 3)
> six.fives
     [,1] [,2] [,3]
[1,]    5    5    5
[2,]    5    5    5
> m %*% six.fives
     [,1] [,2] [,3]
[1,]  500  500  500
[2,]   20   20   20
> m
     [,1] [,2]
[1,]   40   60
[2,]    1    3
> |
```

Матрицы. Имена

```
> output <- c(20,10)
> names(output) <- c("грузовики","автомобили")
> available <- c(1600, 70)
> names(available) <- c("трудодни", "сталь")
> m %*% output[colnames(m)]
          [,1]
трудодни 1600
сталь      70
> apply(m, 1, mean)
трудодни     сталь
      50         2
> m
          автомобили  грузовики
трудодни          40         60
сталь              1          3
> apply(m, 2, mean)
автомобили   грузовики
      20.5        31.5
>
```

Списки

```
> my.lst <- list("exponential", 7, FALSE)
> my.lst
[[1]]
[1] "exponential"

[[2]]
[1] 7

[[3]]
[1] FALSE

> names(my.lst) <- c("family", "mean", "is.symmetric")
> my.lst
$family
[1] "exponential"

$mean
[1] 7

$is.symmetric
[1] FALSE
```

Датафреймы

```
>
> a.matrix <- matrix(c(35,8,10,4), nrow = 2)
> colnames(a.matrix) <- c("v1", "v2")
> a.matrix
     v1 v2
[1,] 35 10
[2,]  8  4
> a.matrix$v1
Ошибка в a.matrix$v1 :$ operator is invalid for atomic vectors
> a.data.frame <- data.frame(a.matrix, logicals = c(TRUE, FALSE))
> a.data.frame
  v1 v2 logicals
1 35 10     TRUE
2  8  4    FALSE
> a.data.frame$v1
[1] 35  8
> a.data.frame[, "v1"]
[1] 35  8
> a.data.frame[2,]
  v1 v2 logicals
2  8  4    FALSE
> colMeans(a.data.frame)
     v1       v2 logicals
   21.5      7.0      0.5
> rbind(a.data.frame, list(v1=-3,v2=-5,logicals=TRUE))
  v1 v2 logicals
1 35 10     TRUE
2  8  4    FALSE
3 -3 -5     TRUE
> rbind(a.data.frame, C(3,4,6))
Ошибка в C(3, 4, 6) :object not interpretable as a factor
> rbind(a.data.frame, c(3,4,6))
  v1 v2 logicals
1 35 10        1
2  8  4        0
3  3  4        6
> |
```